

CLAIMS

1. **Method for wireless communication in a multi-user, multi-carrier communications system, using a multi-carrier resource space of least two dimensions, of which one is frequency, comprising the steps of:**

- obtaining data associated with estimated radio conditions for communication between a first node and a second node,

- providing access to the use of at least two pilot resource configurations, intended for different estimated node radio conditions,

at least one of the at least two pilot resource configurations comprising carriers having both pilot resources and data resources;

- allocating a first resource sub-space of entire said multi-carrier resource space for communication between the first node and the second node,

whereby the first resource sub-space is associated a first pilot resource configuration, being in agreement with pilot need for the estimated radio conditions for the second node.

2. **Method according to claim 1, wherein the entire multi-carrier resource space being divided into parts having different pilot resource configurations;**

whereby the step of allocating comprises the step of selecting the first resource sub-space in a part having a pilot resource configuration suitable for the estimated radio conditions for the second node.

3. **Method according to claim 2, comprising the further steps of:**

- selecting, if no resource space part having a pilot resource configuration suitable for the estimated radio conditions for the second node is available, an arbitrary first multi-carrier resource sub-space; and

- adapting the pilot resource configuration within the first multi-carrier resource sub-space to suit the estimated radio conditions for the second node.

4. **Method according to claim 1, comprising the steps of:**
 - selecting the first multi-carrier resource sub-space; and
 - adapting the pilot resource configuration within the first multi-carrier resource sub-space to suit the estimated radio conditions for the second node after the step of selecting.
5. **Method according to any of the claims 1 to 4, wherein the multi-carrier resource space has a time dimension.**
6. **Method according to any of the claims 1 to 5, wherein the multi-carrier resource space has a code dimension.**
7. **Method according to any of the claims 1 to 6, wherein the multi-carrier resource space has a spatial dimension.**
8. **Method according to any of the claims 1 to 7, wherein the step of obtaining in turn comprises the step of estimating a set of estimated radio conditions.**
9. **Method according to claim 8, wherein the set of estimated radio conditions comprises at least Doppler conditions.**
10. **Method according to claim 8 or 9, wherein the set of estimated radio conditions comprises at least delay spread conditions.**
11. **Method according to any of the claims 8 to 10, wherein the step of estimating is based on position and/or velocity information concerning the second node.**
12. **Method according to any of the claims 1 to 11, wherein the step of obtaining comprises the step of receiving instructions and/or suggestions about preferred pilot resource configuration.**

13. Method according to any of the claims 1 to 12, wherein the first node is selected from the group of:

user equipment;
mobile station;
base station;
access point; and
relay.

14. Method according to any of the claims 1 to 13, wherein the second node is selected from the group of:

user equipment;
mobile station;
base station;
access point; and
relay.

15. Method according to any of the claims 1 to 14, wherein resources of the first resource sub-space are allocated for downlink communication.

16. Method according to claim 15, wherein the step of obtaining data associated with estimated radio conditions for the second node is performed in a base station or access point.

17. Method according to claim 16, comprising the further step of transferring data characterising the first pilot resource configuration from the base station or access point to the second node.

18. Method according to any of the claims 1 to 12, wherein resources of the first resource sub-space are allocated for uplink communication.

19. Method according to claim 18, wherein the step of obtaining data associated with estimated radio conditions for the second node is performed in a base station or access point, followed by the step of transferring the data

associated with estimated radio conditions for the second node to the second node.

20. Method according to claim 18, wherein the step of obtaining data associated with estimated radio conditions for the second node is performed in the second node.

21. Method according to claim 20, comprising the further step of transferring data characterising the first pilot resource configuration from the second node to the first node.

22. Method according to any of the claims 1 to 21, wherein refraining from transmitting pilots in areas of the entire multi-carrier resource space not being allocated.

23. Method according to any of the claims 1 to 22, wherein the wireless communication utilises OFDM.

24. Method according to any of the claims 1 to 23, wherein the available at least two pilot resource configurations comprises different distribution patterns of pilot symbols in the multi-carrier resource space.

25. Method according to claim 24, wherein the available at least two pilot resource configurations further comprises transmission of pilot symbols with differing intensity.

26. Arrangement being or comprising a first node of a multi-user, multi-carrier wireless communications system using a multi-carrier resource space of least two dimensions, of which one is frequency, the first node comprising:

- means for obtaining data associated with estimated radio conditions for communication between the first node and a second node, and

- means for providing access to the use of at least two pilot resource configurations, intended for different estimated node radio conditions,

at least one of the at least two pilot resource configurations comprising carriers having both pilot resources and data resources;

- means for allocating a first resource sub-space of entire said multi-carrier resource space for communication between the first node and the second node,

whereby the first resource sub-space comprises a first pilot resource configuration, being in agreement with pilot need for the estimated radio conditions for the second node.

27. Arrangement according to claim 26, wherein the entire multi-carrier resource space being divided into parts having different pilot resource configurations;

whereby the means for allocating being arranged for selecting the first resource sub-space in a part having a pilot resource configuration suitable for the estimated radio conditions for the second node.

28. Arrangement according to claim 26, wherein the first node further comprises:

means for selecting the first multi-carrier resource sub-space; and

means for adapting the pilot resource configuration within the first multi-carrier resource sub-space to suit the estimated radio conditions for the second node, the means for adapting being connected to an output of the means for selecting.

29. Arrangement according to any of the claims 26 to 28, wherein the first node further comprises:

means for transferring data characterising the first pilot resource configuration from the first node to the second node.

30. **Arrangement according to any of the claims 26 to 29, wherein the means for obtaining data associated with estimated radio conditions for the second node in turn comprises a receiver for receiving instructions and/or suggestions about preferred pilot resource configuration from the second node).**
31. **Arrangement according to any of the claims 26 to 30, wherein the arrangement is a wireless communications system.**
32. **Arrangement according to any of the claims 26 to 31, wherein the arrangement utilises OFDM.**
33. **Arrangement according to any of the claims 26 to 32, wherein the first node is selected from the group of:**
 - user equipment;**
 - mobile station;**
 - base station;**
 - access point; and**
 - relay.**
34. **Arrangement according to any of the claims 26 to 33, wherein the second node is selected from the group of:**
 - user equipment;**
 - mobile station;**
 - base station;**
 - access point; and**
 - relay.**
35. **User equipment capable of being connected to a multi-user, multi-carrier wireless communications system using a multi-carrier resource space of least two dimensions, of which one is frequency, comprising:**

- means for communication between the user equipment and a node utilising a first resource sub-space of entire said multi-carrier resource space,

the first resource sub-space comprises a first pilot resource configuration, out of a set of at least two different pilot resource configurations,

at least one of the at least two pilot resource configurations comprising carriers having both pilot resources and data resources; and

whereby the first pilot resource configuration being in agreement with pilot need for estimated radio conditions for the user equipment.

36. User equipment according to claim 35, comprising:

- receiver for receiving data characterising the first pilot resource configuration from the node;

- means for channel estimation, connected to the receiver,
whereby the means for channel estimation is arranged to perform channel estimation based on the received data characterising the first pilot resource configuration.
